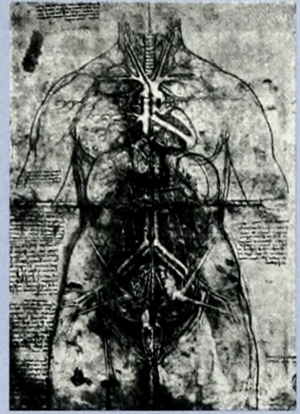


# The Challenges of Human Cloning for Public Policy in Illinois







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# Foreword

This report is a response by the University of Illinois to Senate Resolution 292, adopted by the Senate of the General Assembly of Illinois on April 15, 2000. The resolution, which was offered by Senator J. Bradley Burzynski, requests the University of Illinois prepare a report for the General Assembly that outlines the ethical, religious, legal, and public policy implications of the science of cloning as well as considering the opinions of the general public with respect to cloning. The university asked the Institute of Government and Public Affairs (IGPA) to work with appropriate faculty from the three campuses to produce the report. IGPA assembled a team of faculty experts from the humanities, law, social sciences, and the life sciences for this purpose. The University of Illinois Public Opinion and Public Policy Poll also conducted a survey of Illinois citizens concerning their views on cloning.

The purpose of the report is to inform citizens and the General Assembly about the science of cloning and the ethical and religious issues involved. In addition, the report summarizes the statutes and regulations that various states and the federal government have adopted or considered for restricting or banning cloning and cloning research.

The report begins with basic questions about the science of cloning: What is cloning? Are exact copies of organisms possible? It describes the procedure used to create the cloned sheep Dolly, an achievement that brought the possibility of cloning humans to the attention of the world.

The report then makes five basic points about human cloning:

1) Cloning is important for advances in science and medicine. The processes of cellular differentiation and its pathologies that will be clarified in cloning research are central to understanding the development of organs and the causes of diseases such as cancer.

2) Development of therapeutic cloning offers the potential for substantial improvement in human health. The report outlines a variety of cloning research efforts and procedures that are concerned with cellular and organ development that may be used someday for organ or tissue transplants or the re-growing of spinal tissue, skin or muscle.

3) Cloning for the purpose of human reproduction raises difficult ethical and religious quandaries. Some religious groups express alarm that science is tampering with the basics of human life in inappropriate ways. Others do not object to reproductive cloning. The report outlines the major ethical and religious issues in the use of embryos in cloning procedures and human reproduction through cloning.

4) Unilateral state regulation of cloning raises important legal and policy questions. Some states have passed laws banning the cloning of complete humans and animals as well as research on cloning. The report summarizes current and proposed federal policies concerning human cloning and discusses issues concerning possible relevant constitutional rights to research and to reproduce. It discusses difficulties that would arise with state-level restrictions on cloning that are not matched in other states.

5) Illinois citizens are strongly opposed to the cloning of complete humans but support cloning research designed to produce medical benefits. The survey asks whether citizens approve or disapprove of several kinds of cloning and measures public support for various policies restricting human and animal cloning. It also assesses Illinois citizens' current awareness of the nature of cloning and the potential benefits of cloning procedures.

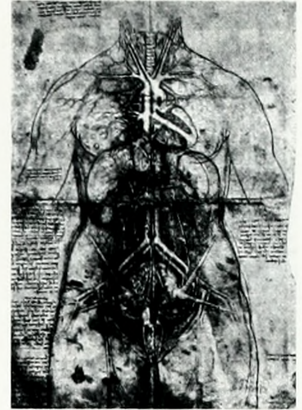
The report represents a multi-disciplinary collaborative effort of the faculty at the Chicago and Urbana-Champaign campuses of the University of Illinois. Committee members consulted numerous existing reports and publications on cloning. The analysis and findings of the report reflect lengthy discussion among the members. The members of the committee have offered to make themselves available to meet with the General Assembly to answer questions or testify before committees.

IGPA invited faculty to serve on the committee who have strong national reputations in their various fields of study to ensure a high quality report. The views expressed in the study report, however, are those of the authors and should not be ascribed to the trustees, officers or faculty of the University of Illinois. Finally, IGPA is grateful for the financial support for the study provided by the Vice President for Academic Affairs of the University of Illinois.

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Director, Institute of Government and Public Affairs
January 8, 2001

# Contents

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# Executive Summary



Among recent technological and scientific advances, somatic cell nuclear transfer (SNT) – the technology of human cloning – presents some of the most exciting prospects for the enhancement of human understanding and human well-being. But SNT also presents some of the most daunting ethical and political challenges of any new technology

In this report we explain the science of SNT and explore the medical and scientific implications of that technique; we examine some of the most important ethical and religious responses to SNT and to human cloning; and we discuss the legal and policy environment relevant to SNT research and human cloning. Our conclusions are these:

1. The results of further research in SNT could be extraordinarily beneficial to human society. Those benefits are likely to include development of new and more effective medical therapies for such conditions as cancer, Parkinson's disease, and damaged vital organs. They would also include a greater understanding of the process of biological differentiation, whereby undifferentiated stem cells become the different organs of a body, and of pathological biological processes, such as cancers.

2. Therapeutic cloning raises moral and ethical questions because it involves creation and destruction of human embryos. The major religious traditions disagree on whether embryos have souls. On the other hand, they generally agree on the obligation of society to care for the sick and suffering. In that sense, SNT research that leads to therapies to alleviate the conditions of profoundly diseased people would seem to be a moral priority. In any case, the creation and destruction of human embryos is allowed under existing public policies for other areas of research and medical practice.

3. SNT research may lead to the cloning of entire human beings. There is general agreement that reproductive cloning is not currently safe and therefore is morally wrong. However, if it should become medically safe, the ethical and religious questions that reproductive cloning raises are very profound. There is absence of agreement among the major religious traditions on the morality of cloning, on whether humans have souls, and on whether humans created through cloning would have souls. Further, while there appears to be no pressing societal need for cloned human beings, that is, cloned humans would not rectify any grave social injustice, individuals may have an important moral right to pursue reproduction through SNT.

4. A very large majority of Illinois citizens oppose human reproductive cloning and support a state ban on such cloning. However, a substantial majority supports cloning of human organs and tissues for medical purposes. Most citizens are not well informed about

cloning and may not yet have well developed opinions about this subject.

5. If Illinois were to regulate or prohibit SNT research and its applications, several legal and policy questions would be raised. Existing or future federal laws may conflict with or preempt state legislation. Constitutional challenges based on the right to research and the right to procreate may also arise. Finally, if Illinois's legislation were more prohibitive than the legislation of other states, significant scientific, medical, commercial, and educational benefits of SNT research and its applications probably would be lost to Illinois.



SNT and its applications in medicine, science, and commerce are tremendously important advances that Illinois, with its great strengths in health care, education, and innovative technology, is poised to pursue. The government of the state of Illinois must consider both how to foster this research and its applications while at the same time standing ready to protect the citizens of Illinois from any excesses, unsafe practices, and other social costs that may flow from this promising new technology.

# Introduction



Science fiction became reality in February 1997 when Ian Wilmut and scientists at the Roslin Institute in Scotland reported that they had cloned an adult sheep to produce an offspring, Dolly.[1] Dolly was the first mammal ever cloned from the genetic material of an adult. Further advances in animal and human cloning have taken place since that time; see Appendix B.

The birth of Dolly was a significant event for science and for society. It proved that an adult somatic cell contains, in usable form, all the genetic material needed to specify an entire animal. It also showed that scientists are now able to produce copies of a mammal that has desirable traits. Finally, it awakened the world to the fact that the cloning of humans could become a reality and gave debates about the ethics of human cloning a new urgency, as well as debates about its legal status and about relevant public policy.

The word "clone," although often used in different contexts, refers to a precise genetic copy of a molecule, cell, plant, animal or human. Specifically at issue is the procedure that created Dolly: *somatic cell nuclear transfer*, or SNT. SNT is the process of taking genetic material from an existing organism and placing it inside an egg cell; the resulting embryo will have virtually the same genetic composition as the organism that donated the genetic material.

Cloning, however, need not result in the gestation and birth of a clone. SNT technology has many non-reproductive uses in biological research and medicine. Cloning research has the potential to give us insight into the mechanisms of cellular and organismal development, and cloning may also be used someday to generate materials for therapeutic purposes, such as organ and tissue transplants.

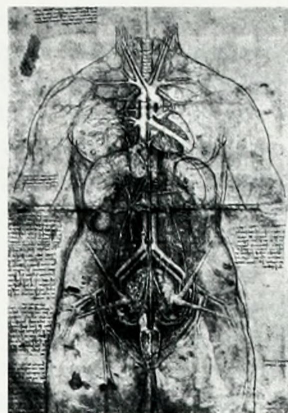
The ethical issues surrounding human cloning extend far beyond the question of producing human beings. SNT's applications in pure scientific research and medical therapy are expected to advance science and may provide treatment to those with previously untreatable or incurable diseases and disabilities. On the other hand, SNT research and therapeutic cloning require scientists to work with human embryos in ways that some ethical and religious traditions find objectionable. There is profound disagreement among the major religions on the morality of both reproductive and therapeutic human cloning.

Several states have passed legislation that restricts human cloning and research on human cloning. Many more states and the federal government have considered, but not adopted, such legislation. A presidential directive currently bans Federal funding for human cloning in the United States. The implications and constitutionality of legislation prohibiting or limiting human cloning are not completely clear. In this report we explore the biomedical, ethical, legal, and public policy implications of human cloning and research on human cloning. A survey of public opinion about cloning in Illinois is attached as Appendix A.

# Introduction

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## Section 1
# The science of cloning



### What is cloning?

The procedure that created the clone called Dolly is *somatic cell nuclear transfer* (SNT), which allows duplication of adult cells and organisms. Mammals contain two different types of cells, somatic cells and reproductive or "germ" cells (sperm cells in males and eggs in females). Somatic cells are those that comprise the organism with the exception of the germ cells. In contrast to somatic cells, which contain two copies (diploid) of each chromosome (initially derived one from the father and one from the mother as a consequence of fertilization), germ cells contain only one chromosomal copy (haploid). Fertilization, which unites two haploid cells from different organisms, ensures the ongoing genetic diversity of the species. A fertilized egg divides repeatedly into a ball of identical cells, which then further divide and begin to differentiate into the muscle, bone, and other types of cells in a complete organism.

Somatic cell nuclear transfer is a method of making a new organism without the genetic mixing involved in fertilization. In SNT, in contrast to sexual union, an already diploid cell supplies the major portion of the genetic material. A diploid nucleus is obtained from almost any type of adult somatic cell and is transferred into an egg that has had its nucleus removed. The "new egg cell" will have a complete set of chromosomes containing the genetic information found in the adult cell. The resulting cell is then encouraged to divide and becomes an embryo. Eventually, the embryo becomes a ball of identical stem cells,[2] which have great therapeutic possibilities and are discussed below. The embryo could also be implanted into the uterus of a prospective mother and allowed to grow into an individual that would be a clone of the donor of the somatic cell nucleus.

Clones can also be propagated by splitting apart the identical cells of any early embryo and allowing them to develop into individual organisms. In fact, this procedure closely resembles the natural mechanism responsible for twinning.[3]

### Are exact copies possible?

Is Dolly an exact clone of the sheep from which her parent cell was taken? While Dolly is a clone, she is probably not exactly identical to that sheep, genetically or otherwise. At least two continuing forces in nature act to impose a barrier on the generation of "exact clones": cellular differentiation and genetic mutation. Differentiation is the process that dictates the expression of genes within a cell, a tissue and an organism. All fertilized cells expand early in life as clones but soon diverge from clonal behavior to specialize, or as the scientist would say, "differentiate," into muscle, skin, and other kinds of cells. The detailed molecular mechanisms through which differentiation is achieved are poorly understood, although research into SNT is expected to greatly aid our understanding. Mutation, on the other hand, involves tiny random

changes in the genetic sequence as cells grow and divide. Because of mutation, a cell might not have exactly the same genetic blueprint as its ancestor. Thus, as cells divide and differentiate, they will develop away from clonal uniformity.



It is likely that exact clones are biological impossibilities. In fact, there is sufficient evidence to show that even identical twins are not 100% identical. The clone and its donor would differ because the clone would be raised in an entirely different physical, chemical and social environment. In addition, the clone inherits a tiny part of its DNA from the mitochondria in the recipient egg cell, not from the transferred nucleus. Finally, we now appreciate that nurture and nature interact in profound ways to determine the characteristics of the organism. All of these inputs will inevitably lead towards a unique organism.

Although the production of mammalian clones has now been shown possible, from the point of view of medicine, reproductive cloning may be a minor use of SNT. Of more immediate importance are the uses of SNT in research and in new medical therapies.

## Research on cellular differentiation and organismal development

Cellular differentiation is central to both normal biology and disease. As a result of the recent biomedical revolution, we now know that a variety of diseases arise from altered bioregulation that affects the differentiation process. For example, cancer often arises as a result of a process in which de-differentiation occurs. Accordingly, cancer cells often behave more like embryonic cells than like adult cells.

Using SNT, scientists can study and experiment with the factors that cause differentiation and de-differentiation, and eventually learn how to trigger those factors. SNT would also allow scientists to create large numbers of identical cells from organisms with known traits, building automatic controls into cellular experiments. SNT may lead to an increased understanding of organismal development as well as provide a valuable tool in other biological research.

## Therapeutic uses of SNT

Of great interest to the medical community is the ability to replace diseased or worn-out tissues and organs. Presently this is accomplished with difficulty. Heart transplants require a deceased donor, and most transplants necessitate suppression of the immune system, increasing the risk for infection. The ability to produce immunologically compatible organs, such as the heart, liver, lungs, and kidneys, through directed differentiation of cloned cells would be a major advance. So too would be the ability to regrow damaged spinal tissue, skin, or muscle.

Toward that aim, the research community is giving great attention to stem cell biology[4]. Stem cells are somatic cells that have the capacity to differentiate into many or all types of somatic cells. Stem cells exist in embryos and adult tissue, but embryonic stem cells are much more versatile. A large number of embryonic stem cells can be harvested from an embryo, and if that embryo had been cloned from an adult somatic cell using SNT, all of its embryonic stem cells (and any tissues or organs created from those stem cells) would be genetically compatible with that donor.

The dream of a transplant surgeon would be to induce a stem cell to divide, proliferate and differentiate into a functioning heart that would be compatible with the donor from which the original stem cell was derived. The more we understand about differentiation, the more likely it will be that the future will allow us to use adult stem cells to induce the plasticity required for organ synthesis. Using adult rather than embryonic stem cells would allow scientists to avoid the creation and destruction of a cloned embryo, thereby solving what some see as a moral problem of tampering with human embryos.



The ability to grow new organs or whole tissues from stem cells is still in the future. However, stem cells are being used today to treat leukemia. The treatment involves the destruction of bone marrow cells in the patient; stem cells from a compatible donor are then transplanted and allowed to develop into new bone marrow cells. SNT might facilitate this treatment by making it easier to generate compatible stem cells. In the treatment of neurological diseases, such as Alzheimer's disease, Parkinson's disease, Lou Gehrig's disease and cerebral palsy, animal experiments have already suggested that transplanted stem cells can ameliorate these pathologies.

## Conclusion

There is general agreement among biomedical scientists that the study of and advances arising from somatic cell nuclear transfer technology, including a more complete understanding of biological differentiation, will be of major importance to the continuing progress of the biomedical revolution and the treatment of major diseases facing mankind. Human SNT will be vital to this biomedical revolution as it provides scientists with the tools for studying cellular development and producing valuable stem cells.

## Section 2
# The ethics of cloning



This section focuses on the ethical implications of human cloning. There are implications of somatic cell nuclear transfer (SNT) for biomedical research, development of new medical therapies, and human reproduction.

### The ethics of human SNT

The process of SNT research involves the creation and use of cloned human embryos. The use of human embryos in research is a sensitive issue with respect to ethics, politics, and religion because of the divided opinions over the moral status of those embryos.

Some moral perspectives question the morality of producing human embryos through SNT or any other technique. For example, some commentators find that the laboratory production of human embryos represents a profound disrespect toward human life.[5] By contrast, other moral views confer no sacrosanct status to human embryos. Some commentators find that the production and use of human embryos is fully justified by reason of expected therapeutic benefits.[6] These commentators judge the morality of embryo use in terms of benefit to humanity rather than on the basis of intrinsic properties of the embryo. It is important to note that human embryos are currently produced and used by methods other than SNT. For example, fertility clinics produce significant numbers of embryos in order to increase the likelihood of pregnancy via embryo transfer.

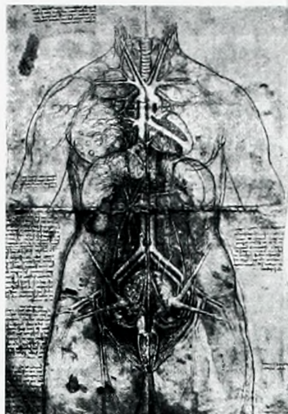
While it is true that some moral viewpoints do not accept human embryo research, the democratic process has nevertheless forged a domain in which some of this research may be conducted. The social accommodation of some human embryo research has been reached through the democratic process, and presumably reflects a legitimate balancing of divergent moral viewpoints. It is possible to see human SNT research as an extension of currently accepted methods of research involving human embryos.

Over and above the question of research on human embryos, SNT also raises the possibility of producing a human being. Using SNT to produce a child has no parallels in human reproductive history. It is an entirely novel mechanism by which a human being might be produced. Up until Scottish researchers announced in 1997 that they had cloned a sheep, there had been very little sustained analysis about the ethics of cloning human beings.[7] The commentary that did exist did not identify any specific mechanism by which cloning might occur and was therefore not especially useful in regard to framing the ethical implications associated with human cloning. The technique of SNT would change all that. The outlines of the ethical debate about producing a human being are described below,[8] following an analysis of the ethics of SNT research for therapeutic purposes.

### The ethics of therapeutic SNT

Apart from making contributions to basic scientific knowledge, SNT research may eventually lead to the development

of medical therapies. SNT technology may identify ways to treat diseases that currently lack any effective treatment. SNT research may also contribute to the alleviation of disabilities for which there is an unsatisfactory treatment. In other words, two classes of people may benefit from science with SNT: those whose disorders currently lack any useful therapy and those whose disorders might be more effectively controlled.



Some bioethics commentary has insisted that, as a matter of social justice, biomedical research should focus on people who suffer from gravely disabling conditions for which there is no effective therapy.[9] Using this logic, a case can be made that human SNT research should be pursued as a matter of moral priority if it works to alleviate the conditions of profoundly ill people for whom there are currently no effective therapies.

Some commentators maintain that SNT research is not the only pathway to biomedical progress. These commentators believe that other programs of research can lead to the medical innovations attributed to human SNT research.[10] Whether this is true remains to be seen, but it does remain true that some scientists and commentators believe that SNT research will lead to important biomedical discoveries that cannot be achieved any other way.

On the basis of its relative importance in contributing to both basic research and to medical technology, it can be said that there are strong moral incentives for conducting SNT research that has as its goal the understanding and treatment of human diseases and disorders.[11]

## The ethics of reproductive cloning

Probably the most controversial aspect of human SNT is the possibility of its use to produce a child. At present there is, however, a strong ethical consensus that there is insufficient evidence of safety to justify efforts to produce human beings with SNT.[12] Beyond the matter of safety, there are diverging ethical viewpoints about the morality of producing human beings via SNT. Even assuming that human reproductive cloning could become as safe as other methods of producing a child, we have not yet fully resolved the ethics of doing so.

A variety of concerns have been raised about the morality of using SNT to produce a human being. One of the most comprehensive summaries of the issues surrounding human reproductive cloning is the report by the National Bioethics Advisory Commission, *Cloning Human Beings*.[13] This report was requested by President Clinton immediately after the news of Dolly's birth became public. The NBAC report identified the following key arguments against using SNT to produce a human being:[14]

1. **Physical harms.** These harms include, for example, dangers to women via hormonal manipulation as well as developmental disorders in the child that are related to unknown effects of SNT.

2. **Psychological harms.** These include threats to a sense of value and unique identity as well as threats to psychological integrity caused by expectations that the child will be identical to, or share particular characteristics with, the person whose genome is used in the SNT.

3. **Harms to the family.** Another worry is that the very mechanisms of SNT are incompatible with the kind of values that parents ought to have toward their children. That is, commentators believe that parents ought to be open and welcoming of children as individuals with their own identities and traits. In other words, SNT might change the terms of parental attitudes toward children.



4. **Harms to social values.** Some commentators worry that SNT would change social expectations about children, valuing them only insofar as they conform to parental expectations. There is worry that the element of control over the genetics of children would translate into a confining set of expectations about what children should be and how they should be valued. These worries extend to notions that persons will be unduly objectified and that eugenic motives will pervade society's attitudes toward children.

For each of these possible harms, there are commentators who dispute that the objectionable effect must necessarily occur or that the effect would occur on a large enough scale to be significant. Indeed, the National Bioethics Advisory Commission itself took pains to note that some of these harms are speculative or could be brought under control. Most commentators believe, for example, that SNT would not be widely used to produce children. Its expense and failure rate will limit its availability, while moral objections will keep many from using it. If it is not widely practiced, there will be little reason to worry about significant social changes in family dynamics on a broad scale. Other commentators have noted that profound sets of expectations with regard to the traits of children – such as their language skills, their religion, their intelligence, their education, and so on – are in some instances already the norm and that SNT by itself need not raise these expectations to an unacceptable level.

After reviewing the main arguments against the use of SNT for producing a child, the National Bioethics Advisory Commission did not find the arguments that it should never happen to be credible. The Commission did conclude, however, that there were sufficient reasons at the present time to justify a moral prohibition against attempting to produce a child via SNT. They conclude that it would be irresponsible for clinicians or others to attempt to produce a child via SNT given the present state of knowledge. They rightly acknowledge that the state of knowledge about SNT and its safety may change over time, at which point the ethics of attempting to produce a human being should be re-assessed.

## Motives for reproductive cloning

The question of whether it would ever be justified to produce a human being via SNT is different from the question of whether the technique would be medically safe. Even if the technique were to become as safe as other means of reproduction for mother and child, it is hard to say that the use of SNT for the purpose of producing a child would have a high moral priority.

At the present time, there is no demonstrated social need for humans specifically produced via SNT. That is, there are no major social deficits that would be remedied by the mere existence of cloned human beings. Cloned human beings in themselves are no solution to any important social problem.[15]

That said, some individual desires could be met by human beings produced using SNT. For example, some infertile persons who want to be parents might see SNT as a way to have genetically-related children they could not otherwise have. As another example, some persons might wish to use SNT to reproduce the genetics of a particularly beloved person, or they might simply wish to have and raise "genetic copies" of themselves or an existing child. Others might see reproductive cloning as a safe way to reproduce without passing along serious genetic diseases such as Tay-Sachs, or they might desire a compatible tissue donor for an existing child who is ill. It is not generally held in the ethics literature at this point, however, that these possible uses of SNT establish a broad social duty to pursue these outcomes.



Even if there is no pressing social need for cloned human beings, people may have rights to exercise in pursuing the use of SNT to produce children. We do not discuss these rights here. They are discussed as matters of law in Section 4. Suffice it to say here that even if society chose not to pursue investment in the production of cloned children, that choice would not abridge any moral rights that individuals may have to pursue reproductive SNT as a private matter.

## Informed consent in reproductive SNT

It has already been mentioned that one of the key questions about using SNT to produce a child is the safety of the technique. No human conception and development, let alone childhood, is free of risks. Nevertheless, because mammalian SNT technology is only about four years old, it is unclear what long-term risks might be involved. Consequently, any efforts to defend the practice of using SNT to produce a child bear the burden of showing that worries about safety would be unwarranted.

There is a question about whether a parent – and especially a woman who would bear the pregnancy of an SNT-produced embryo – could be advised in a meaningful way about the risks and benefits of the technique. Because of the informational gap about the safety of the technique when used for having a child, it is unclear that there is a sufficient basis for truly informed consent for would-be parents.

## Social impact of reproductive SNT

The use of SNT to produce children would be a novel event without exact parallel in human history. It is therefore desirable to have broad social debate about its possible impact. At the present time, however, that debate goes forward under the acknowledgment that the social impact of using SNT to produce human beings is speculative.

The first birth of a child produced via SNT would certainly be an event in the international media. Such was the case, for example, with the 1970s birth of Louise Brown, the first child born through the successful use of *in vitro* fertilization (IVF). Since that time, however, tens of thousands of children have been born around the world through the use of IVF, and no such media attention has followed them. Moreover, there is no evidence available that there are biological and psychological risks to these children that would justify halting the use of the techniques.

Children born by way of SNT might face legal uncertainties, such as contested questions about exact parentage.[16] (For example, if a child were produced using a cell from a single woman, who, as a matter of law, is the father of that child, if anyone?). Similar problems follow births involving surrogate mothers and donated eggs. Many states resolve the problem of who the mother is – the egg donor or the birth mother – by affirming the birth mother as the mother as a matter of law. Since legislatures could intervene to control some of the status problems associated with SNT births, it is unclear that these questions by themselves amount to a strong reason to bar the technique. Nevertheless, the questions involved in the legal status and entitlements of children born this way could provoke considerable legislative and judicial activity.



If the techniques of SNT were to become safe in producing children and if the legal standing and entitlements of children born this way could be made perfectly clear, political events might lead to restrictions on reproductive SNT. For example, if large numbers of people opposed reproductive SNT on moral or religious grounds, they might move the levers of the democratic process to restrict the production of children this way. By the same token, reproductive SNT could fall into the mold of IVF and be used to produce children successfully without causing major controversy. SNT techniques might become familiar and routine if they produce healthy children without fundamentally disrupting social dynamics.

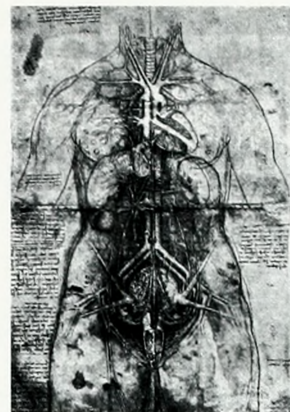
## Conclusion

Human SNT research raises ethical dilemmas in the sense that it forces decisions about which conflicting values and goals to pursue. At this time, there is a strong ethical case for pursuing SNT research and therapeutic cloning. Aside from major advances in science regarding knowledge of cellular differentiation, pathology, and organismal development, human SNT research may lead to new and better medical treatments. These considerations are offset by concerns about respecting the beliefs of persons who object to the use of cloned human embryos.

The ethical implications of reproductive cloning are much more complex. While reproductive SNT would have less benefit to society as a whole than would therapeutic SNT, individuals may have the right to reproduce in this way. The impact of reproductive SNT on children, families, and society is speculative. Whether those impacts elicit acceptance, regulation, or outright prohibition will remain a question open to developments in science, the exercise of moral scrutiny, the rule of law, and the democratic process.

Given the importance of human SNT and its ethical concerns, institutions and organizations that have responsibility for education and initiating public debate should encourage attention to human SNT research and applications.

## Section 3
# Cloning and religion



Many people turn to religious teachings as a source of moral guidance. There is much that religions agree upon with respect to cloning, but there are important differences among them. Such differences concern both cloning as a method of human reproduction and SNT research for scientific and therapeutic purposes. A balanced review of religious doctrines with regard to human cloning is readily available in the National Bioethics Advisory Commission's 1997 report, *Cloning Human Beings*, Chapter 3 (available on-line at http://bioethics.gov). In this section we briefly summarize the main areas of religious agreement and disagreement in these matters.

### Reproductive cloning

There are significant differences among religious faiths about the morality of human reproductive cloning. People of many faiths strongly oppose such cloning as morally abhorrent. Many believe that to clone human beings would represent people "playing God," or attempting to usurp God's role as the Creator. Some condemn human reproductive cloning as severing what they consider a natural and God-given connection of procreation with sexual intercourse.[17]

Nevertheless, many religious believers would disagree. People of some faiths would view the capability for reproductive cloning as itself a gift from God. If the ability to reproduce by means of cloning became available, some would endorse the technique as helping otherwise childless couples to fulfill a religious obligation to reproduce. Some would hold that God must approve a method of reproduction that promotes human life and enriches the lives of childless couples.[18] Some religious groups would regard reproductive cloning as consistent with God's role as Creator because it would not create new life, but rather would manipulate the development of already living human cells.

### Therapeutic cloning and cloning research

There are disagreements among faiths with regard to SNT research that is designed to seek improvements in scientific understanding or to develop techniques of therapeutic cloning. The main issue is the production and use of human embryos that occurs in such research, and the resulting deaths of such embryos. Some groups, notably the Roman Catholic Church, believe that a human embryo is an ensouled human being. Thus SNT research that results in the death of embryos involves a morally unacceptable destruction of human life.

On the other hand, some religious groups do not believe that an embryo has any significant moral status, holding that moral personhood arises much later in the development of a fetus or even at birth. They thus have no objection to the use of embryos in SNT research. And other religious groups take a position between these poles: that is, that an embryo has some moral status as a form of human life and a potential person, but that the potential benefits of therapeutic cloning

and advancements in scientific knowledge are so large for actual persons that they outweigh the moral loss of sacrificing embryos.[19]

## Religious compassion and forms of cloning



For some religious groups, considerations of religious compassion are likely to play an important role in determining positions on different forms of human cloning. There is broad agreement among many religions on the belief that society should look after the neediest and most vulnerable. The major religions express this obligation, for example, in the ideals of "love thy neighbor," of seeing God in the face of every beggar, and in other teachings.[20]

Setting other religious considerations aside, this doctrine may lead some religious people to approve therapeutic cloning. Therapeutic cloning may result in new medical treatments, better understanding of how disease progresses, and a better quality of life for many of those who suffer the most, both medically and financially. A great burden of disease could be lifted through therapeutic cloning.

The implications of religious compassion for reproductive cloning are less clear. At least in the short run, the availability of this reproductive option would benefit mainly affluent infertile couples in developed countries. An emphasis on helping those most in need may not support devoting scarce resources to the development of this technique.

## Conclusion

Religions disagree about the morality of human reproductive cloning, the concept of the soul, and the moral status of embryos. Society must choose how to reflect these varying religious and political beliefs in its public policy toward both reproductive and therapeutic cloning.

In general, many religions agree that society has a moral obligation to care for the needy and vulnerable. This belief provides a moral basis for directing society's resources toward the development of therapeutic, but not necessarily reproductive, cloning.

Section 4

# Legal and policy issues



As an initial matter, Illinois's authority to regulate somatic cell nuclear transfer (SNT), should the legislature decide to do so as a policy matter, would stem from its police power to safeguard public health and safety. There are, however, two primary potential limitations on that regulatory authority. First, the federal government could use its regulatory authority to preempt state regulation of SNT research or applications. Second, the United States Constitution may confer a right to research or to procreate that would limit state regulation of SNT.

## Federal regulation

*Potential Federal SNT Legislation.* To date, Congress has not passed legislation restricting SNT, although multiple bills were introduced in the wake of Dolly publicity and the National Bioethics Advisory Commission Report issued in 1997, which recommended a federal legislative ban. (See Appendix C.) Some of the bills would have banned the use of federal funding for research on human cloning, leaving only the question of state and private SNT research funding to be decided by the states. Other federal bills would have prohibited human cloning research more broadly, some imposing criminal sanctions. The most restrictive would have prohibited any form of SNT research altogether. This total SNT ban was opposed by numerous scientific and patient advocacy groups who feared harm to biomedical research. The bills did not survive a filibuster, and have not been revived. The only bills introduced in the just adjourned 106th Congress were funding bans.

If Congress renews its interest in a moratorium on human cloning, a crucial issue for the states is whether or not the federal legislation would preempt state law. Any prediction is speculative, but some of the initial bills did contain preemption provisions, and given the national dimensions to the policy issues, which we discuss below, it would not be at all surprising for Congress to decide that uniform standards are necessary and to prevent state regulation of SNT research and applications completely.

Looking beyond the legislative response to the current state of cloning technology, it is important to note that some of the most feared results of human cloning are banned by the Thirteenth Amendment to the U.S. Constitution, which prohibits involuntary servitude. Although the amendment was adopted in 1865 and was originally aimed at slavery, it would apply equally well to the disturbing scenario of clones created to do society's undesirable work. This amendment should set to rest fears of cloned human worker bees or soldier ants, and guarantee that such images will continue to exist only in science fiction movies.

*Food and Drug Administration.* One likely reason Congress has not passed federal legislation to regulate human cloning is that the Food and Drug Administration (FDA) has announced that it has authority to require prior approval of any human cloning activity. The agency does not claim authority to resolve the ultimate questions concerning the desirability of creating a human

being, but it does assert jurisdiction over human cloning experiments. According to the FDA, clinical research on creating a human using cloning technology would require the same approval process as an investigational new drug (IND). The agency has further stated that it "will ensure that such experimentation does not proceed until basic questions about safety are answered."[21]



The IND approval process entails a rigorous, multi-step review with continuing oversight. Even after granting approval, the FDA could delay or suspend a clinical investigation at any time if it finds that "[h]uman subjects are or would be exposed to an unreasonable and significant risk of illness or injury."[22] Under the FDA's authority, anyone who proceeded with human cloning without FDA approval would be subject to civil and/or criminal sanctions. In order for the FDA to exercise this authority over human cloning, a clone or the SNT process would need to fit within the definition of a "biological product" under the Public Health Service Act, or a "drug" or "medical device" under the Food, Drug and Cosmetics Act. One legal commentator has questioned whether human cloning fits into any of these classifications when used for procreative purposes rather than disease prevention or cure.[23] But the FDA has not had to exercise its regulatory authority, and so its scope remains untested.

## Constitutional limitations

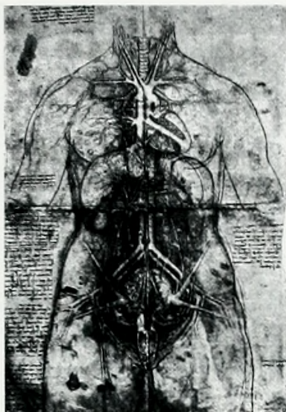
Even without preemptive federal legislation or action by the Food and Drug Administration, state regulation of SNT could be limited by rights conferred in the U.S. Constitution. One potential limit is a right to conduct research. Another is a right to procreate. Although neither right has been recognized by the U.S. Supreme Court to date, either one could conceivably be created in an appropriate case as an extension of existing law.

*A Right to Research?* There is an argument that the First Amendment right to free speech includes the freedom to pursue knowledge. The U.S. Supreme Court has drawn an analogy between the information function performed by the press, which has First Amendment protection, and that performed by academic researchers. And a lower court has suggested in dicta that advancing the state of knowledge through research is a protected right. The First Amendment protects the marketplace of ideas; so, by extension it may protect the creation of information for that marketplace, as it protects other precursors to speech, such as financing speech or gathering information for news. Yet other lower courts have flatly rejected the idea of a fundamental right to scientific inquiry in the context of medical research on fetuses, and it is uncertain which line of reasoning the U.S. Supreme Court would endorse.[24]

Even if the Court were to find a constitutional right to conduct research, Illinois would still be able to regulate SNT research to protect against compelling harms. The state could regulate a researcher's methods to protect the rights of research subjects and the well-being of society so long as the regulation is no more restrictive than necessary for that protection. For example, informed consent is a common requirement to protect the autonomy of research subjects. In addition, areas of research that are regulated for the public safety and national security include such well-known

examples as encryption and development of biological weapons.

*A Right to Procreate?* Commentators contend that the constitutional guarantees of privacy and liberty that protect the right to make decisions about reproduction should also be interpreted to protect a right to procreate that includes human cloning.[25] At present, however, the U.S. Supreme Court's cases do not establish rights beyond those connected with traditional reproduction, although lower courts have recognized rights to procreate in numerous contexts.



In its cases on contraception and abortion, the U.S. Supreme Court has often declared that the fundamental liberty and privacy rights found in the Constitution include the right to make decisions about parenthood:

> If the right of privacy means anything, it is the right of the individual, married or single, to be free from unwarranted governmental intrusion into matters so fundamentally affecting a person as the decision whether to bear or beget a child.[26]

This broad language could encompass a general right to procreation in all its forms, including cloning. One might also draw that conclusion from *Skinner v. Oklahoma,* a decision from 1942 that is the most recent case in which the Court addresses the affirmative right to procreate. In striking down a statute that authorized the sterilization of certain categories of criminals, the Court described the right to procreate as "one of the basic civil rights of man."[27]

But despite the expansive language the Court has used in these cases, the actual legal holdings are narrower. The cases involving contraception or abortion concern preventing or terminating reproduction rather than creating life. The *Skinner* case was about involuntary termination of the capacity to reproduce. Most importantly, all of the Court's cases have dealt with traditional forms of reproduction; none establishes an individual right to procreate by means of new technologies.

Some state courts and lower federal courts, however, have rendered decisions with significant implications for new reproductive techniques. As recognized by the Tennessee Supreme Court in one of these cases: "Previously, courts have dealt with the child-bearing and child-rearing aspects of parenthood. Abortion cases have dealt with gestational parenthood. In this case the Court must deal with the question of genetic parenthood."[28]

An increasing number of state courts have articulated two fundamental constitutional rights of equal significance – the right to procreate and the right not to procreate – which they have applied in disputes stemming from the availability of new reproductive technologies, such as in vitro fertilization (IVF), egg donation, gestational surrogacy, and cryogenic storage of early embryos. When a divorcing couple in Tennessee disagreed about the fate of early embryos created by joining their eggs and sperm for IVF, the state's highest court recognized a constitutional right that gave the couple decisional authority over the early embryos. The court found that "the state's interest in potential human life is

insufficient to justify an infringement on the gamete-providers' procreational autonomy."[29] Courts in New Jersey and Washington similarly found constitutional rights to autonomy in procreation based on gamete donation. Other states have observed progenitors' autonomy to control the disposition of early embryos formed from their gametes, without interference from the state, by enforcing the couples' contracts to donate the early embryos to the IVF clinic for research.



In Illinois, a federal court recognized an affirmative right to procreation using new technology when it struck down an Illinois abortion law in 1990. The law prohibited any experimentation on a fetus unless the experimentation was therapeutic to the fetus. The court found that procedures such as embryo transfer were designed to aid a woman in achieving pregnancy, yet were also experimental and, because of the attendant risks, not therapeutic for the embryo. These procedures thus fell within the statute's prohibitions, a result that the court found violated a woman's constitutional right of privacy to make reproductive decisions. In the court's judgment, "within the cluster of constitutionally protected choices that includes the right to have access to contraceptives, there must be included. . . the right to submit to a medical procedure that may bring about, rather than prevent, pregnancy."[30]

These state and lower court decisions are based on rationales that point toward including human cloning within the protections of acknowledged constitutional rights. In response to advances in scientific knowledge, the courts have extended the right to procreate beyond traditional methods of human reproduction to include ways of achieving pregnancies that were unimagined only decades ago. The use of human cloning as a substitute method of providing a child in response to reproductive failure would arguably serve the same procreative purpose these courts have found protected by the Constitution in the context of IVF, gamete or embryo donation, and surrogacy. The argument for extending these cases is that it is difficult to see a legal distinction between human cloning and these other reproductive methods in terms of an individual's right to procreate, especially if cloning provides the only possible way to beget a child.

There are also arguments that the rationales of these cases on new reproductive technologies have little to do with human cloning. Some legal commentators voice the view that creating a child through human cloning is different in kind from other methods of reproduction, and should therefore be excluded from constitutional protection for procreation.[31] They point out that cloning involves the replication of a single genome, and thus, it is distinct from typical sexual reproduction, in which genetic material is combined from two sources. With cloning, one would not only be producing a child, but a child with a specific genome.[32] Part of what is disturbing is the enhanced control over the genetic composition of the child that is possible when choosing the adult who would be the source of the somatic cell nucleus. This ability to select does not by itself, however, distinguish human cloning from IVF, where early embryos can be tested and chosen for specific genetic traits.[33]

The question the courts will have to answer is whether or not the result of joining two haploid gametes from a man

and a woman is different in a legally significant way from the consequence of joining a diploid nucleus with an enucleated egg to provide a complete genome for an offspring. This issue has not been considered by any court.



If the courts were to find a fundamental constitutional right to procreate using cloning, this would limit the ability of states to regulate SNT. The traditional formulation is that a state may not impair a fundamental right unless the regulation is narrowly tailored to a "compelling state interest." More recently, the court has stated that regulation may not place an "undue burden" on a liberty interest. One legal expert suggests that even under the strict scrutiny the court gives to compelling interests, "the potential physical and psychological risks of cloning an entire individual are sufficiently compelling to justify banning the procedure."[34] Assuming that cloning techniques eventually become safe enough to be used as a reproductive procedure, another view is that legislatures could appropriately set policy on issues such as the link between cloning and rearing responsibilities, consent of the clone source and others involved in the process, and the form of oversight through professional organizations or governmental agency, but could not completely ban the use of SNT to produce offspring in all circumstances.[35] Yet a third approach anticipates a variety of possible levels of scrutiny by the court with a range of permissible regulations that would depend on the degree of liberty the court finds appropriate for human cloning as a form of procreation.[36]

## Current regulation of SNT technology

At the present time, the federal government bans human cloning with federal funds, and several state statutes ban research on human cloning, at least temporarily. In addition, some bans on embryo research have implications for SNT work.

### The federal moratorium

In 1997, President Clinton issued a prohibition of the use of federal funds for cloning of human beings. This prohibition remains in effect. The president also requested all researchers, including those supported by other sources of funding, to impose a "voluntary moratorium on the cloning of human beings."[37] The funding ban on human cloning was designed to supplement a preexisting ban on using federal funds for human embryo research, initially announced by the president and since included annually in the appropriations for the Department of Health and Human Services. In the most recent development concerning SNT, when the National Institutes of Health set guidelines for allowing experimentation on stem cells derived from fetal tissue or discarded IVF embryos, stem cells produced using SNT were excluded and declared "ineligible" for federal funding of research on stem cells.[38]

### SNT regulation in the states

Although legislation to ban human cloning has been introduced in many state legislatures, almost all have rejected it (see Appendix C). Only four states have enacted comprehensive legislation. The first to do so was California in 1997, followed by Michigan and Rhode Island in 1998, and Louisiana in

1999. In addition, Missouri enacted a ban on the use of state funds for research with respect to cloning a human.[39]

The California legislation prohibits "clon[ing] a human being" and makes a violation punishable by a civil fine. It defines "clone" as "creating or attempting to create a human being by transferring the nucleus from a human cell from whatever source" into an enucleated human egg "to initiate a pregnancy that could result in the birth of a human being." It is thus a ban on cloning for human reproductive purposes. The legislature attempted to limit the unforeseen effects of this prohibition on therapeutic research using SNT with a statement of intent, which declares that the moratorium is not intended to apply "to the cloning of human cells, human tissue, or human organs that would not result in the replication of an entire human being." Louisiana's cloning statute closely tracks the language in the California statute, except that Louisiana additionally prohibits the use of state funds or of any health facility to clone or attempt to clone a human being.



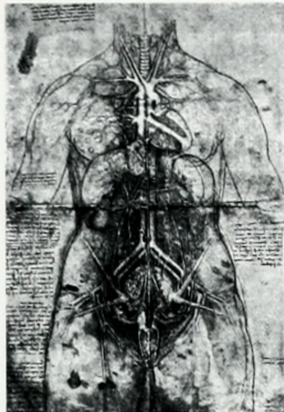
Michigan's statute defines cloning as any use of SNT technology to produce a human embryo, and prohibits intentional human cloning and attempted human cloning. Unlike the other cloning statutes, it is part of the state penal code: a person who violates the statute is guilty of a felony punishable by imprisonment and/or a fine. The nuclear transfer need not result in a pregnancy to violate the law; all that is necessary is that the resulting egg cell is "capable of differentiating and maturing into a complete human being." Accordingly, the ban covers therapeutic applications as well as reproductive use, although it excludes from coverage "scientific research or cell-based therapies not specifically prohibited" by the statute.

Rhode Island takes yet a third approach, establishing a broad prohibition on SNT for human reproduction coupled with extensive exclusions for both research and acceptable reproductive procedures. SNT may not be used to initiate or attempt to initiate a human pregnancy. In addition, persons may not "create genetically identical human beings by dividing a blastocyst, zygote, or embryo." Violations are punishable by an administrative fine. The statute lists research techniques that are not restricted, including cloning molecules, DNA, cells, and tissues; mitochondrial, cytoplasmic or gene therapy; and using SNT to create animals. Reproductive techniques such as IVF or other medical procedures to assist pregnancy are acceptable, "so long as pregnancy is not intended to result in the production of a child who is genetically identical to another human being, living or dead." Natural identical twins, which would fall within this prohibition, are excepted.

All of these bans except Michigan's and Missouri's contain sunset clauses. Unless the legislatures take further action, California's provision will expire in January 2003, and Louisiana's and Rhode Island's prohibitions will expire in July 2003.

In addition to these statues dealing specifically with cloning, a number of states have legislation banning scientific research on embryos. Most of these statutes, however, are inapplicable to cloning. They tend to prohibit research or experimentation on products of conception, which do not include the eggs and nuclei involved in SNT. An exception that appears to ban cloning

research for reproductive purposes is found in New Hampshire.[40] The statute appears to allow cloning research at the genetic and cellular level and during early stages of embryo development, but it prohibits transfer to a woman's uterus if any experimentation occurred. The statute also sets a 14-day limit on ex utero development, which could limit therapeutic as well as reproductive research.



## Proposed Illinois law

On February 24, 2000, the Illinois Senate passed SB 649, which would place a moratorium on human cloning for reproductive purposes until 2005. The bill's definition of cloning follows the language of the California and Louisiana statutes, so that it prohibits implanting the product of SNT "to initiate a pregnancy that could result in the birth of a human being." The senate bill also criminalizes this cloning activity, making it a Class 4 felony. It also provides that any sperm bank, surgical treatment center or hospital that violates the act shall have its license revoked. The bill limits its restrictions on biomedical research by explicitly confining its reach to the cloning uses expressly prohibited in the act.

The bill as passed by the Senate thus intends to permit cloning genes, cells and tissues to develop medical therapies of the type described in Section 1. Even so, the definition of cloning may place unintended restrictions on research to solve infertility problems in couples with faulty cytoplasm in the woman's eggs or on biotechnologies as yet unanticipated.[41]

After passage in the senate, the bill was sent to the Illinois House of Representatives, where it was extensively amended. With house amendments 001 and 002, the pending version of SB 649 prohibits:

> creat[ing] or attempt[ing] to create using human somatic cell nucleus transfer technology a human being, human embryo, or human fetus by transferring the nucleus from a human cell from whatever source into a human egg from which the nucleus has been removed <u>for any purpose</u> regardless of whether or not the resulting product could result in a human embryo, human fetus, or human being and regardless of whether it is intended to be implanted into a person and may or may not result in a pregnancy and a birth of a human being. (emphasis added)

This definition of cloning expands the ban from reproductive to therapeutic applications of SNT. The bill adds a proviso that may be intended to soften the effect of the ban on biotechnological research in the state, defining "clone" to exclude "duplicating or replicating human DNA sequences, organs, tissues, or cells." This proviso, however, has no effect on the underlying prohibition of SNT "for any purpose." As the bill is written, the DNA sequences, organs, tissues, or cells permitted to be duplicated could not result from the transfer of a nucleus into an egg. The House version of the bill thus would prevent all research using the technique of SNT, whether or not it is related to human procreation.

If enacted into law, the amended Illinois House bill would be far more restrictive of research than the moratoria in effect in California, Louisiana, and Rhode Island

and the research restrictions in New Hampshire. It could also be more restrictive than Michigan's prohibition, which is limited to research on cellular products that are capable of differentiating and growing into human beings. The Illinois House bill also restricts research more than any of the bills introduced but not enacted in other state legislatures during last year's sessions, all of which concerned the use of cloning for reproductive purposes. The scope of the proposed prohibition and the criminal penalties that attach to it could have harmful effects on research in Illinois.



These examples of state legislation also clearly show how dramatically cloning legislation can vary, based on how "cloning" is defined. Too broad a definition might have unintended consequences, harming beneficial research and medical advances and potentially hurting a state's competitiveness in the biotechnology and medical fields. On the other hand, too narrow a definition might leave loopholes that permit exactly those activities legislators most hoped to restrict. And any definition could become outdated as newer medical and scientific procedures are invented.

## Interstate competition and the proposed Illinois statute

One of the important matters for the state of Illinois, or any other state, to consider in deciding whether and how to regulate SNT research and human cloning is the policies of other states. Analysts of public policy have long been aware of potential problems for state policy associated with economic competition between states. Such problems may occur if a state decides to regulate an activity more heavily than the other states with which it competes. The more severe regulation may cause firms, skilled employees, or investment capital to move to less regulated environments in those other states.

Such movement will have adverse economic consequences for the states with the more severe regulation. It may defeat the purpose of the regulation, if the regulated activity simply moves across a border. In the end, it may even force the abandonment of those regulations. Indeed, analysts speculate that interstate competition will lead to a "race to the bottom," in which all states eventually adopt roughly the same, minimally effective policies to avoid competitive disadvantage. (The same effects may also occur at the international level: National governments that adopt severe regulations on, or taxation of, a particular activity may experience losses of firms, employees, or capital to other countries.)

These considerations are relevant to the deliberations in any state, such as Illinois, that is considering regulations on SNT research. Such research is likely to produce new medical therapies; to attract funding and outstanding researchers to universities; to help create and maintain outstanding medical centers; to yield new biotechnology products and processes; and to generate new firms in biotechnology, health care, and related areas. A state that chooses to regulate SNT research more severely than other states may lose these developments to other states.

## Conclusion

Human cloning research and applications are currently legal in all but a few states. The possibility of unilateral state prohibition or regulation of SNT research and its applications raises several legal and policy questions. The federal govern-

ment could pass laws preempting or in conflict with state legislation. In addition, state prohibition or regulation of SNT could face constitutional challenges if the rights to research and to procreate were to be recognized by the U.S. Supreme Court. Poorly defined scientific terminology could result in a ban on potentially beneficial applications, and policymakers must also recognize that science will continue to advance in directions legislation cannot anticipate. Finally, if SNT proves to be medically safe and important, the benefits of SNT technology might flow elsewhere and be lost to any state that enacts prohibitive legislation.



# Conclusion



Somatic cell nuclear transfer is a novel technique for creating new organisms or portions of organisms. Among recent technological and scientific advances, this technique presents some of the most exciting prospects for the enhancement of human understanding and human well-being. At the same time, SNT presents daunting ethical and political challenges.

Research in SNT can have several extremely important consequences. It will greatly expand human understanding of the important but poorly understood processes of biological differentiation, by which undifferentiated stem cells become the different parts of a complete organism. A greater understanding of differentiation will almost certainly lead to important medical advances – as in the treatment of debilitating but currently untreatable conditions such as Alzheimer's disease, and therapeutic cloning to replace damaged vital organs.

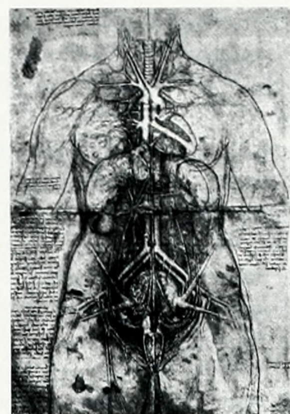
These consequences are extremely desirable. We conclude, therefore, that broad state restrictions on SNT research and its applications would likely have very high social costs – including the possible loss of significant scientific, medical, commercial, and educational benefits to any state that enacts prohibitive legislation.

Another potential consequence of SNT research is far more controversial. It may eventually lead to the cloning of entire human beings. Illinois citizens currently are strongly opposed to this development. In any case, human cloning presents profound ethical and legal challenges. There is absence of agreement among the major religious traditions on the morality of cloning, on whether humans have souls, and on whether humans created through cloning would have souls. There are also difficult ethical considerations. While there appears to be no pressing societal need for cloned human beings, individuals may have a moral right to pursue reproduction through SNT. Finally, there are important legal and policy questions affecting a prohibition of human reproductive cloning at the state level. State prohibition of human reproductive cloning could face constitutional challenges. And because a ban in Illinois would not prevent the development of this practice in other states – if other states chose to permit it – such state action could be relatively ineffective or produce adverse competitive consequences for the state.

SNT and its applications in medicine, science, and commerce are tremendously important advances that Illinois, with its great strengths in health care, education, and innovative technology, is poised to pursue. The government of the state of Illinois must consider how to foster the desirable forms of this research and its applications while at the same time standing ready to protect the citizens of Illinois from any excesses, unsafe practices, and other social costs that may flow from this promising new technology.

## Appendix A

# Illinois public opinion



At the request of the cloning study group, the Public Opinion and Public Policy Poll conducted a survey to determine the preferences and beliefs of Illinois citizens about human and animal cloning and public policy toward cloning – especially the possible regulation of cloning and cloning research by the Illinois state government. The survey was conducted from December 5-21, 2000, with a representative sample of 507 Illinois adults.[43]

The survey instrument was designed to accomplish several purposes. First, it measures Illinois citizens' current attitudes toward cloning, cloning research, and possible state regulation. Second, it permits selected comparisons of Illinois public opinion to national public opinion (at an earlier time) on these subjects. Third, it compares opinions that citizens express when they are asked broad questions without background or context – in the manner of most opinion polls – with those they express when they receive some contextual information and are asked more refined questions. These comparisons may suggest the effect of somewhat more informed deliberation than is typical of opinion polls. They may also indicate the directions in which opinion is more likely to change if public awareness of the issues increases in the course of debate among political leaders. Finally, the survey explores some of the individual differences – ranging from religious beliefs and political ideology to income and education, among others – that affect opinion about cloning.

The picture of Illinois public opinion about cloning that emerges is quite complex. The responses of Illinoisans on issues about cloning depended heavily on what questions they were asked, and what background information they received. On the one hand, large majorities expressed disapproval of both

**Table 1. Opinion on Cloning, Broad Questions, Illinois and United States**

| | Illinois 12/2000 % yes | Illinois 12/2000 % no | U.S. 3/1997* % yes |
|---|---|---|---|
| Is animal cloning morally unacceptable? | 53 | 37 | 66 |
| Is human cloning morally unacceptable? | 84 | 11 | 89 |
| Is cloning human beings against God's will? | 66 | 20 | 74 |
| Are you scared by the prospect of cloning humans? | 63 | 31 | 69 |
| Should Illinois regulate animal cloning? | 58 | 34 | 67** |
| Should Illinois regulate human cloning? | 63 | 32 | # |
| Should Illinois ban research on human cloning? | 61 | 33 | # |

* Time/CNN Poll.
** Question referred to the federal government, not Illinois.
\# No comparable question.

human and animal cloning and endorsed state regulation, including a state ban on research on human cloning. On the other hand, when respondents received some background information, such as distinctions between different types of cloning and references to the objectives of cloning research, responses on some issues were very different. Although a very large majority favored a ban on cloning complete humans, Illinoisans were evenly divided on cloning complete animals, and a majority opposed a ban on cloning human tissues and organs. In addition, respondents strongly supported cloning of human organs and tissues if it would produce medical advances, and when asked, most believed that it would produce such advances.



## Opinions on cloning and regulation

To assess Illinoisans' feelings about cloning and cloning regulation, we divided the respondents randomly into two roughly equal-sized groups, each receiving a different series of questions about cloning and cloning policy. Group 1 received a set of questions that were largely derived from the most widely cited national poll on cloning, a March 1997 Time/CNN poll, with a few additional questions about state policy. All of the questions addressed broad attitudes toward cloning and cloning regulation, without providing any context or background information.

The public's opposition to cloning and support for regulation of cloning, under this condition, were very strong. (See Table 1.) A large majority found cloning of animals morally unacceptable, and a nearly 8-1 majority found cloning of humans morally unacceptable. Most respondents said that cloning human beings is "against God's will," and that they were "scared by the prospect of cloning humans." Roughly 2-1 majorities supported state regulation of animal and human cloning, and a state ban on research on human cloning.

Despite the clear direction of these opinions, Illinoisans' responses were still significantly less opposed to cloning than the national public's had been three and half years earlier. Because the national poll has not been repeated, we cannot determine whether Illinois citizens are

**Table 2. Awareness of Cloning, Definition and Possible Benefits**

| | |
|---|---|
| Answered correctly that: | |
| Using a cell from one sheep to grow a second sheep is cloning: | 83% |
| Fertility drugs causing multiple births at the same time is not cloning: | 71% |
| Using a cell from a human to develop a human tissue or organ is cloning: | 58% |
| Answered all three items correctly: | 34% |
| Answered two items correctly: | 49% |
| Has heard of "possible benefits" of research on cloning: | 45% |
| Possible benefits recalled (if heard of benefits): | |
| Better food production | 5% |
| Better medical treatments | 70% |
| Scientific progress | 7% |
| Other | 8% |

more accepting of cloning than the national public, or rather opposition to cloning has declined during this period. Both may be true in some degree.



An important question about these opinions is how much awareness they reflect – to what extent Illinois citizens understand what cloning is and why researchers have been seeking to develop cloning techniques. To explore this awareness (again using Group 1), we followed the above policy questions with two kinds of further questions: one determining whether respondents understood what cloning is, and another determining whether they were familiar with the possible benefits that are the presumed goals of cloning research.

On the whole, Illinois citizens do not have a clear grasp of these matters. (See Table 2.) Only one-third of the respondents were able to answer correctly all three of a set of simple questions about what is and is not cloning. Most knew that using a cell from one sheep to grow a second sheep is cloning. But almost one-third failed to know that fertility drugs causing multiple births at the same time is not cloning, and almost half failed to know that using a cell from a human to develop a human tissue or organ is cloning. Since merely guessing would be expected to yield 3 consecutive correct answers about 13 percent of the time, the number of respondents who actually knew what constitutes cloning is probably considerably less than one-third.

Similarly, only 45 percent of the respondents said they had heard of any possible benefits of cloning. Those who said they had heard of possible benefits were then asked what kinds of benefits they had heard of. Most mentioned improved medical treatments, with a few mentioning better food production, scientific progress, or other benefits. In short, many Illinois citizens have only a vague sense of what cloning is – in particular, they are unaware of some kinds of cloning – and are not aware of the possible social and scientific benefits that largely motivate the development of cloning.

To find out how opinions might differ from these under somewhat more deliberative conditions, we treated Group 2 differently. First, we asked a series of questions that were intended mainly to provide certain background information and orientation ("Have you heard that…?"). We informed respondents that: in cloning, scientists take a cell from the body of a human or an animal and cause it to multiply; that researchers have cloned complete, living animals; and that in some kinds of cloning, researchers try to grow tissues or organs that can be used for scientific or medical purposes. Second, we asked this group relatively

**Table 3. Opinion on Cloning, Refined Options, After Receiving Information**

| | % yes | % no |
|---|---|---|
| Should Illinois ban cloning of complete animals? | 43 | 41 |
| Should Illinois ban cloning of animal tissues and organs? | 29 | 60 |
| Should Illinois ban cloning of complete humans? | 80 | 11 |
| Should Illinois ban cloning of human tissues and organs? | 35 | 54 |

specific questions about whether the state should ban several kinds of cloning.

On one major point, there is no significant difference from the findings on Group 1. Eighty percent of Group 2 felt that Illinois should ban cloning of complete humans. (See Table 3.) But the other findings look quite different. In contrast with the strong pro-regulation sentiment that appeared in Group 1, Group 2 was evenly divided about whether the state should ban cloning of complete animals. Only a minority (35 percent) favored a ban on cloning human tissues and organs, and an even smaller minority favored such a ban with respect to animals.



We also asked Group 2 about whether they would approve of certain types of cloning if they would result in certain benefits. Respondents made sharp distinctions. Only 18 percent approved cloning humans "if it would enable infertile couples to have biologically related children." (See Table 4.) But they were evenly divided on cloning animals "if it would help produce better and cheaper foods." And a more than 3-1 majority approved cloning human tissues and organs "if it would lead to important advances in medical treatment." Such differentiated responses, and especially the strong endorsement of human organ and tissue cloning for medical purposes, would have been hard to predict from the results of the broader questions, without background information, reported in Table 1.

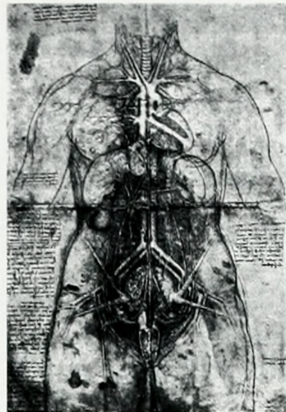
### Perceptions of cloning and governmental roles

We asked several questions that were designed to discover Illinois citizens' perceptions on some of the possible or claimed consequences of cloning that may affect citizens' opinions. For the most part, there was no clear direction of these perceptions. (See Table 5.) Respondents were mostly skeptical that cloning would bring better and cheaper foods. Fewer than half believed that cloning humans would enable infertile couples to have biologically related children. (In any case, as noted above, few accepted that benefit as a satisfactory justification for human cloning). On the other hand, about the same proportion felt that the death of a human embryo in cloning research would be the death of a person. Each of these questions prompted at least 17% of respondents to decline to answer, probably suggesting that most respondents had never thought about these questions, and that the direction of opinion could shift substantially if there were significant public debate about them. The only question that demonstrated a strong direction of opinion was

**Table 4. Opinion on Cloning for Specific Purposes**

| Would you approve: | % yes | % no |
|---|---|---|
| cloning animals if it would help produce better.cheaper foods? | 43 | 44 |
| cloning human tissues and organs if it would lead to important advances in medical treatment? | 72 | 21 |
| cloning humans if it would enable infertile couples to have biologically related children? | 18 | 68 |

that about the potential medical benefits of human organ and tissue cloning, where a 5-1 majority said they expected important advances in medical treatment. It is striking that although only 45 percent of respondents reported they had heard of any possible benefits of cloning, 73 percent believed that such medical benefits would occur, when they were asked specifically about such benefits. This suggests that if arguments about medical benefits of human cloning were advanced prominently in a public debate about regulation, they would likely find a receptive audience.



We also asked respondents which level of government should have responsibility for cloning regulation. The largest group, 49 percent, endorsed a shared federal and state responsibility. (See Table 6.) A substantial minority felt that the federal government should have sole responsibility, with virtually no Illinoisans considering this exclusively a state issue.

## Demographic, political, and religious differences

Finally, we asked a variety of questions about demographic characteristics, political attitudes, and religious orientation to determine to what extent differences in opinion about cloning reflect these underlying differences among citizens. Table 7 presents comparisons showing the differences between various demographic, regional, and political groups with respect to two of the policy questions we have discussed – one on banning human organ and tissue cloning, and one on banning cloning of complete animals. (We do not use the question

**TABLE 5. PERCEIVED CONSEQUENCES OF CLONING**

| | % yes | % no |
|---|---|---|
| Research on animal cloning would help produce better and cheaper foods* | 36 | 44 |
| Research on cloning human tissues and organs would lead to important advances in medical treatment* | 73 | 14 |
| Research on cloning humans would enable infertile couples to have biologically related children* | 44 | 36 |
| The death of a human embryo in cloning research would be the death of a person | 46 | 37 |

* Not asked of Group 1, which had received the closely related questions reported in Table 4.

**TABLE 6. OPINION ABOUT LEVELS OF GOVERNMENT AND CLONING POLICY**

| Which level of government should make cloning policy? | % |
|---|---|
| Federal | 37 |
| State | 4 |
| Both Federal and State | 49 |

about banning cloning of complete human beings for these comparisons because support for such a ban is so overwhelming that group differences are minimal.)

Briefly stated, support for the ban on human organ and tissue cloning is stronger Downstate and in the Chicago suburbs than in the City of Chicago; among people with lower incomes; among the less educated; among women; among persons over 55 years old; and among African Americans.



With respect to politics, Republicans and conservatives are more supportive of such a ban than Democrats and liberals. With some exceptions, the patterns are similar on the issue of banning cloning of complete animals.

Table 8 presents the same kinds of comparisons for various religious groups. Many citizens undoubtedly think of their position on cloning in religious terms. As noted above, two-thirds of the respondents agreed that cloning human

**Table 7. Demographic and Political Differences in Opinion on Cloning**

| Support for state ban on | human organ cloning<br>% yes | complete animal cloning<br>% yes |
|---|---|---|
| Chicago | 28 | 42 |
| Chicago Suburbs | 38 | 44 |
| Downstate | 35 | 44 |
| Less than $30,000 Income | 37 | 53 |
| $30,000-$60,000 Income | 36 | 45 |
| More than $60,000 Income | 26 | 30 |
| 18-35 Years Old | 28 | 46 |
| 36-55 Years Old | 34 | 37 |
| Over 55 Years Old | 44 | 47 |
| Men | 29 | 36 |
| Women | 39 | 49 |
| African American | 52 | 61 |
| White/Caucasian | 35 | 40 |
| High School Graduate or Less | 47 | 55 |
| Some College | 29 | 43 |
| College Graduate or Postgraduate | 29 | 35 |
| Employed in Agriculture | 33 | 33 |
| Employed in Health Care | 43 | 46 |
| Republican | 40 | 44 |
| Democrat | 34 | 48 |
| Independent | 29 | 41 |
| Conservative | 54 | 56 |
| Liberal | 21 | 3 |
| Moderate | 26 | 38 |
| **Total** | 35 | 43 |

beings "is against God's will." Nevertheless, differences in opinion about cloning are not dramatically shaped by differences in religious belief. Catholics are 12 percentage points more likely to favor banning human organ and tissue cloning than Protestants, and 9 percentage points more likely than members of "Other" religious groups. (Jews, Muslims, and other religious groups were too infrequent in our sample to permit separate analysis.) Among Christians, fundamentalists were more likely to favor the ban than members of the mainstream denominations. But no religious group (including those who said religion was "very important" in their lives) exceeded the average level of support for the ban by more than 10 percent, or exceeded the support from those who said they were "not a member of a religion" by more than 17 percent. Although Catholics and fundamentalist Protestants provided significantly greater support for restrictions on cloning than other religious groups, differences about cloning – where they occur – were not primarily religious differences.



## Conclusion

Polls can be useful to policymakers for help both in identifying the public's values and preferences with respect to an issue, and in anticipating the likely public reaction to possible proposals and the resulting debates

The findings of our survey suggest that most Illinoisans have not thought very much about public policy toward cloning. Asked very broad questions about whether they approve cloning and whether they favor state regulation – without background information or reference to specific forms of regulation – they appeared strongly inclined to restrict cloning.

But when respondents were given some background information and more specific options, their responses were highly differentiated. They remained massively opposed to cloning of complete humans. Very few changed their minds about such cloning when the purpose was described as enabling infertile couples to have biologically related children. But they were fairly evenly divided on cloning complete

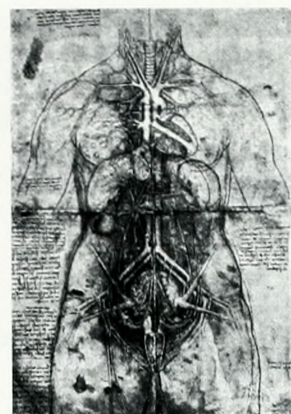
**Table 8. Religious Differences in Opinion on Cloning**

| Support for state ban on | human organ cloning % yes | complete animal cloning % yes |
|---|---|---|
| Protestant | 31 | 42 |
| Catholic | 43 | 47 |
| Other Religion | 34 | 47 |
| Not Religious | 28 | 38 |
| Fundamentalist Christian | 45 | 53 |
| Very Religious | 41 | 49 |
| **Total** | 35 | 43 |

animals for the sake of improved food production. And a large majority supported cloning of human organs and tissues for medical purposes. Only a small minority of respondents supported a ban on cloning animal organs and tissues. Finally, nearly all respondents recognized an appropriate, if not necessarily exclusive, role for the federal government in regulating cloning.



## Appendix B
# Advances in cloning



April 1998: Dolly had her first lamb, which was healthy and normal. ("Sheep clone has offspring." ABCNews.com, 23 April 1998)

April 1998: Researchers at the University of Colorado and the University of Massachusetts successfully treated Parkinson's disease in rats with the fetal brain cells of cloned transgenic cows. (Advanced Cellular Technology press release, 28 April 1998) Transgenic animals are those in which a foreign gene is inserted into an animal's DNA sequence.

July 1998: Scientists at the University of Hawaii developed a new method for performing SNT with a higher success rate, and also demonstrated that clones of clones (mice, in this case) are born healthy and fertile. (Leutwyler, Kristin. "Send in the clones." *Scientific American*, 27 July 1998)

June 1999: The first human clone was created by a private biotech company in Massachusetts. The clone was created through SNT by inserting a human nucleus into a cow egg, and allowing the embryo to grow to 12 days old. The company's goal was not reproductive cloning, but rather the cultivation of human stem cells. (Sung, Ellen. "First human embryo cloned." Policy.com, 21 June 1999)

March 2000: A litter of five piglets, all cloned from one adult, was born in Virginia ("This little piggy is a clone." AgBioTechNet.com, 15 March 2000). Pigs have to date been the most promising source of organs for transplant into humans. The ability to clone healthy pigs with predictable genes is one step towards successful transplantation; the other step is the ability to insert and knock out certain genes that would otherwise cause transplanted organs to be rejected by the recipient.

April 2000: Scientists in Europe have successfully performed nuclear transfers between human egg cells, a potential aid to women whose infertility is the result of a cytoplasm problem. The nucleus of a woman's egg can be placed inside a donor egg, and the resulting egg can then be fertilized in vitro and implanted into the womb of the nucleus donor. The resulting child would be almost 100% the genetic offspring of the birth mother and father. (Boseley, Sarah. "Fertility breakthrough raises human cloning fears." *Sydney Morning Herald*, 28 April 2000) While this procedure involves egg nuclei rather than somatic cell nuclei, it represents the kinds of innovations stemming from SNT research that could potentially be outlawed by overbroad legislation.

May 2000: Australian scientists produced their first cloned animal, a calf, and the local development of this technology holds great promise for the Australian dairy and beef industries. The Australian technique used differentiated fetal cells as the nucleus source. Being able to develop their own procedure allowed Australians to avoid having to purchase the technology from overseas. (Smith, Deborah. "Suzi leads herd as first in a cloning revolution." *Sydney Morning Herald*, 3 May 2000)

June 2000: The first transgenic clones in a species other than mice were born in

Scotland. The scientists successfully inserted new DNA into sheep nuclei and then placed those nuclei inside enucleated sheep eggs, resulting in two transgenic lambs. (Reaney, Patricia. "UK firm uses gene targeting to create cloned lambs." Reuters news release, 28 June 2000)



October 2000: SNT was used to help save an endangered species, the Asian gaur, from extinction. A somatic cell nucleus from a living gaur was inserted into the egg cell of a cow and then implanted into that cow for gestation. The cow was near full-term as of the writing of the article. Scientists have much hope for using SNT technology to preserve other endangered and recently-extinct species. (Perlman, Heidi B. "Scientists close to cloning extinct animals." *Chicago Tribune*, 9 October 2000) The American Museum of Natural History's website suggests that as many as 100 species will become extinct every day as we head into the 21st century, and man's activities on the planet have accelerated the rate of extinction dramatically.

# Appendix C
# Legislation and cases



## Legislation proposed but not enacted

### Federal:

S. 368, 105th Cong. (1997) (to ban federal funding)

H.R. 922, 105th Cong. (1997) (to ban federal funding)

H.R. 923, 105th Cong. (1997) (broad ban with criminal sanctions)

S. 1574, 105th Cong. (1998) (broad ban with criminal sanctions)

S. 1599, 105th Cong. (1998) (broad ban with criminal sanctions)

S. 1601, 105th Cong. (1998) (broad ban with criminal sanctions)

S. 1602, 105th Cong. (1998) (broad ban with criminal sanctions)

H.R. 3133, 105th Cong (1998) (to ban federal funding)

H.R. 571, 106th Cong. (1999) (to ban federal funding)

H.R. 2326, 106th Cong. (1999) (to ban federal funding)

### States:

Ala. Senate Bill 511, 1997 Reg. Sess. (1997)

Md. House Bill 28, 1997 Reg. Sess. (1997)

Mo. House Bill 824, 89th Gen. Ass. (1997)

N.Y. Senate Bill 2877, 220th Leg. Sess. (1997)

N.Y. Assembly Bill 5383, 220th Leg. Sess. (1997)

N.J. Assembly Bill 2849, 207th Leg. (1997)

Ore. Senate Bill 1017, 69th Leg. Ass. (1997)

S.C. House Bill 3617, 112th Gen. Ass. Sess. (1997)

W.V. Senate Bill 410, 73d Leg. (1997)

Ala. Senate Bill 8, 1998 Reg. Sess. (1998)

Ala. Senate Bill 68, 1998 Reg. Sess. (1998)

Conn. House Bill 5475, 1998 Reg. Sess. Gen Assembly (1998)

Del. Senate Bill 241, 139th Gen. Ass., 2d Sess. (1998)

Ga. House Bill 1508, 144th Gen. Ass. (1998)

Haw. House Bill 3206, 19th Leg. (1998)

Ind. Senate Bill 411, 110th Gen. Ass., 2d Sess. (1998)

Kan. House Bill 2846, 77th Leg. (1998)

Mass. Senate Bill 1440, 181st Gen. Court (1998)

Md. House Bill 932, 1998 Reg. Sess. (1998)

Md. H.J.R. Bill 11, 1998 Reg. Sess. (1998)

Minn. Senate File 2423, 80th Reg. Sess. (1998)

Minn. House File 2730, 80th Reg. Sess. (1998)

Miss. House Bill 996, 1998 Reg. Sess. (1998)

N.H. House Bill 1658, 155th Sess., 2d Year (1998)

N.J. Assembly Bill 329, 208th Leg. (1998)

N.Y. Senate Bill 5993, 221st Leg. Sess. (1998)

N.Y. Assembly Bill 9116, 221st Leg. Sess. (1998)

N.Y. Assembly Bill 9183, 221st Leg. Sess. (1998)

Ohio House Bill 675, 122d Gen. Ass. (1998)

Ohio Senate Bill 218, 122d Gen. Ass. (1998)

Pa. House Bill 2138, 182d Gen. Ass. (1998)

Tenn. Senate Bill 2208, 100th Gen. Ass. (1998)

Tenn. Senate Bill 2299, 100th Gen. Ass. (1998)

Tenn. House Bill 2198, 100th Gen. Ass. (1998)

Tenn. House Bill 2281, 100th Gen. Ass. (1998)

Vir. House Bill 752, 1999 Sess. (1998)

Wisc. Assembly Bill 769, 93d Reg. Sess. (1998)

Conn. House Bill 5042, 1999 Reg. Sess. Gen. Ass. (1999)

Mass. Senate Bill 1399, 181st Gen. Court (1999)

Mass. House Bill 2455, 181st Gen. Court (1999)

Mass. House Bill 2462, 181st Gen. Court (1999)

N.Y. Senate Bill 1179, 222d Leg. Sess. (1999)

N.Y. Senate Bill 1954, 222d Leg. Sess. (1999)

N.Y. Senate Bill 2123, 222d Leg. Sess. (1999)

N.Y. Assembly Bill 3026, 222d Leg. Sess. (1999)

N.Y. Assembly Bill 6874, 222d Leg. Sess. (1999)

N.Y. Assembly Bill 8333, 222d Leg. Sess. (1999)

N.Y. Assembly Bill 8341, 222d Leg. Sess. (1999)

Or. Senate Bill 794, 70th Leg. Ass. (1999)

Mass. Senate Bill 1394, 182d Gen. Court (2000)

N.J. Assembly Bill 289, 209th Leg. (2000)

N.Y. Senate Bill 6538, 223d Leg. (2000)

Okla. House Bill 2071, 47th Leg., 2d Sess. (2000)

Tex. Senate Bill 102, 77th Leg. (2001) (prefiled).



### Selected cases relevant to a right to research

*Branzburg v. Hayes*, 408 U.S. 665, 705 (1972) (drawing analogy between information function of the press and of researchers); *id.* at 681-82 (First Amendment protection for gathering of information as precursor to news).

*Buckley v. Valeo*, 435 U.S. 765 (1978) (First Amendment protection for financing as precursor of speech).

*Henley v. Wise*, 303 F. Supp. 62 (N.D. Ind. 1969) (describing "right" to research).

*Margaret S. v. Edwards*, 488 F. Supp. 181, 220-21 (E.D. La. 1990) (no fundamental right to conduct medical research on fetuses).

*Wynn v. Scott*, 449 F. Supp. 1302 (1978), *aff'd sub nom.* Wynn v. Carey, 599 F.2d 193 (7th Cir. 1979) (no fundamental right to conduct medical research on fetuses).

### Selected cases relevant to a right to procreate

*Skinner v. Oklahoma*, 316 U.S. 535. 541 (1942) (procreation is "one of the basic civil rights of man").

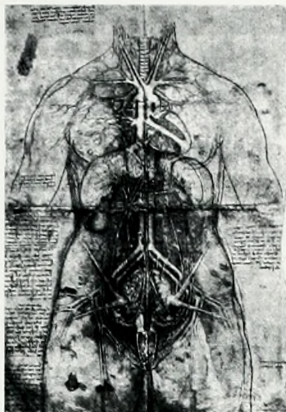
*Eisenstadt v. Baird*, 405 U.S. 438, 453 (1972) (privacy means freedom from governmental intrusion into decision whether of not to bear or beget a child).

*Carey v. Population Services International*, 431 U.S. 678, 685 (1977) (decision whether or not to beget or bear a child fundamental to individual autonomy).

*Planned Parenthood v. Casey*, 505 U.S. 833, 857 (1992) (reaffirming the "recognized protection accorded to liberty relating to intimate relationships, the family, and decisions about whether to

bear and beget a child").

*Lifchez v. Hartigan*, 735 F. Supp. 1361 (N.D. Ill. 1990) (recognizing right to medical procedure to bring about pregnancy).



*Davis v. Davis,* 842 S.W.2d 588, 603 (Tenn. 1992) (recognizing parents' constitutional right to make procreational decision).

*Kass v. Kass*, 673 N.Y.S.2d 350 (N.Y. 1998) (enforcing divorcing spouses' contract to donate early embryos to IVF clinic for research).

*J.B. v. M.B.*, 751 A.2d 613, 618 (N.J. Super. Ct. 2000) (destruction of preembryos would not violate former husband's right to procreate because he could do so without IVF).

*Litowitz v. Litowitz*, 10 P.3d 1086, 1092 (Wash. Ct. App. 2000) (former husband has right not to procreate via preembryos created from his sperm and eggs from donor).

*Cahill v. Cahill*, 757 So.2d 465 (Ala. Ct. App. 2000) (enforcing divorcing spouses' contract to donate early embryos to IVF clinic for research).

*A.Z. v. B.Z.*, 725 N.E.2d 1051, 1057 (Mass. 2000) (refusing to enforce couple's contract with IVF clinic against former husband when it would force him to become a parent against his will).

# Endnotes



[1] Ian Wilmut, et al. "Viable Offspring Derived from Fetal and Adult Mammalian Cells," *Nature* 385 (1997): 810-813.

[2] Stem cells are generic somatic cells that have the ability to differentiate into many different kinds of cells.

[3] Since such induced twinning does not duplicate an existing adult, it has not been a source of controversy and will not be discussed in this report.

[4]Douglas Steinberg, "Stem Cell Discoveries Stir Debate," The Scientist (vol. 14, no. 22, 13 November 2000).

[5] Leon Kass, "The Wisdom of Repugnance," in *Flesh of my Flesh: The Ethics of Cloning Humans,* Gregory E. Pence, ed., (Lanham, MD: Rowman and Littlefield, 1998).

[6] For example, see Gregory E. Pence, *Re-Creating Medicine* (Lanham, MD: Rowman & Littlefield, 2000).

[7] Some useful starting points include, for example, Ruth F. Chadwick, "Cloning," *Philosophy* 57 (1982): 201-209; Hans Jonas, *Philosophical Essays: From Ancient Creed to Technological Man* (Englewood Cliffs, NJ: Prentice-Hall, 1974); John A. Robertson, "The Question of Human Cloning," *Hastings Center Report 24* (1994): 6-14.

[8] Most of the issues under debate in cloning human beings may be found in Gregory E. Pence, *Who's Afraid of Human Cloning* (Lanham, MD: Rowman and Littlefield, 1998); Gregory E. Pence, ed., *Flesh of my Flesh: The Ethics of Cloning Humans* (Lanham, MD: Rowman and Littlefield, 1998); and Martha Nussbaum and Cass R. Sunstein, eds., *Clones and Clones: Facts and Fantasies about Human Cloning* (New York: Oxford University Press, 1998).

[9] The roots of this school of thought lie in John Rawls, *A Theory of Justice*, rev. ed. (Cambridge: Belknap Press, 1999).

[10] *See, for example,* the views expressed online at stemcellresearch.org.

[11] Further discussion of the ethics of SNT for research purposes is to be found in Paul Lauritzen, ed., *Cloning and the Future of Human Embryo Research* (New York: Oxford University Press, 2000). This volume contains a discussion of religious and ethical views of using SNT for research purposes. There are some less developed discussions about using SNT to produce children.

[12] See National Bioethics Advisory Commission, *Cloning Human Beings*, Vol. 1 (Rockville, MD: National Bioethics Advisory Commission, 1997).

[13] National Bioethics Advisory Commission, *Cloning Human Beings*. June 1997.

[14] National Bioethics Advisory Commission, *Cloning Human Beings*, pp. 61-62.

[15] For further discussion along these lines see, Dan W. Brock, "Cloning Human Beings: An Assessment of the Ethical Issues Pro and Con," in *Clones and Clones: Facts and Fantasies about Human Cloning* Martha Nussbaum and Cass R. Sunstein, eds., (New York: Oxford University Press, 1998), pp. 141-164.

[16] See Lori B. Andrews, "The Current and Future Legal Status of Cloning," in *Cloning Human Beings: Report and Recommendations of the National Bioethics Advisory Commission*, Vol. II (Rockville, MD: National Bioethics Advisory Commission), pp. F1-F55.

[17]The negative voices include Paul Ramsey, who claims that reproductive cloning would change "procreation" into "reproduction" and would sever the "unitive" and "procreative" ends of human sexual expression. (Paul Ramsey, *Fabricated Man: The Ethics of Genetic Control* (New Haven: Yale University Press, 1970)) The Roman Catholic tradition contends that reproductive cloning would be contrary to human dignity. Thus according to Donum Vitae, an encyclical issued by the Congregation for the Doctrine of the Faith in 1987, "attempts [at] obtaining a human being without any connection with sexuality through ... cloning ... are to be considered contrary to the moral law, since they are in opposition to the dignity both of human procreation and the conjugal union."

[18]Examples of religious thinkers whose attitude to reproductive cloning is overall positive include the Protestant theologian Ted Peters (*Playing God? Genetic Discrimination and Human Freedom* (New York: Routledge, 1997)) and the Muslim scholar

Abdulaziz Sachedina ("Islamic Perspectives on Cloning," Testimony before the National Bioethics Advisory Commission, March 14th, 1997). The Jewish scholar Rabbi Michael J. Broyde concludes his analysis of the implications of Jewish law with these remarks: "In sum, one is inclined to state that halacha views cloning as far less than the ideal way to reproduce people; however when no other method is available it would appear that Jewish law accepts that having children through cloning is perhaps a mitzvah [which is an action that is either obligatory or commendable but not obligatory] in a number of circumstances and is morally neutral in a number of other circumstances." ("Cloning People and Jewish Law: A Preliminary Analysis" (1999), available at http://www.us-israel.org/jsource/Judaism/clone1.html)



[19] See National Bioethics Advisory Commission, *Ethical Issues in Human Stem Cell Research*, Vol. 1, p. 103, (Rockville, MD: National Bioethics Advisory Commission, 1999). See also *Cloning Human Beings*, Vol. 3, (Rockville, MD: National Bioethics Advisory Commission, 1997).

[20] In the New Testament we find this statement: "The second most important commandment is ... : 'Love your neighbor as you love yourself.'" (Matthew 22, v. 39) Classical discussions of the meaning of the love commandment include Anders Nygren, *Agape and Eros* (trans. Philip S. Watson (London: S.P.C.K., 1957)) and Gene Outka, Agape*: An Ethical Analysis* (New Haven: Yale University Press, 1972). Compassion is emphasized in many religious traditions. One of its clearest and best known articulations is in the ideal of the Bodhisattva in Buddhism. The Boddhisattva is someone who has achieved enlightenment but rather than attaining Nirvana has remained in the world out of compassion for others and in an attempt to help all creatures attain enlightenment. In their *Economic Justice for All: Catholic Social Teaching and the U.S. Economy*, published in 1986, the Catholic Bishops in the United States defended what they called "a fundamental option for the poor": "As Christians we are called to respond to the needs of *all* our brothers and sisters, but those with the greatest needs require the greatest response." (*Economic Justice for All: Catholic Social Teaching and the U.S. Economy*, vol. 3, in *Documents of American Catholic History*, ed. John Tracy Ellis, (Wilmington: Michael Glazer, 1987) 3: 981.

[21] Congressional Record. 105th Cong., 2nd session, 1998. Vol. 144, S561. Letter to Senator Edward Kennedy of Massachusetts from FDA Deputy Commissioner for External Affairs Sharon Smith Holston, concerning Senate Bill 1601 to prohibit the cloning of human beings. *See also* Rick Weiss, *Human Clone Research Will Be Regulated,* Wash. Post, Jan. 20, 1998, at A1 (quoting Acting FDA Commissioner Friedman as announcing: "Through the Food, Drug and Cosmetic Act we do have authority to regulate human cloning, and we are prepared to assert that authority.").

[22] *Code of Federal Regulations*, Vol. 21, Section 312.42 (b) (i) and 312.44 (b) (i) (2000).

[23] *See* Elizabeth C. Price, "Does the FDA have Authority to Regulate Human Cloning?," *Harvard Journal of Law and Technology*. 11 (1998): 619.

[24] *See, e.g.*, Roy G. Spece, Jr. & Jennifer Weinzeirl, *First Amendment Protection of Experimentation: A Critical Review and Tentative Synthesis/Reconstruction of the Literature*, 8 S. Cal. Interdisc. L.J. 185 (1998).

[25] *See, e.g.*, Ira H. Carmen, *Cloning and the Constitution: An Inquiry Into Governmental Policymaking and Genetic Experimentation* (1985) 170-92: John A. Robertson, "Liberty, Identity, and Human Cloning," *Texas Law Review*, 76 (1998) 1371.

[26] *Eisenstadt v. Baird*, 405 U.S. 438, 453 (1972).

[27] *Skinner v. Oklahoma*, 316 U.S. 535, 542 (1942).

[28] *Davis v. Davis*, 842 S.W.2d 588, 603 (Tenn. 1992).

[29] *Ibid*, 602. Because there was no prior contract to control the dispute, the court compared the former husband's interest in not procreating with the former wife's interest in donating the early embryos for implantation and decided for the husband, finding that his interest implicated his procreational autonomy to a greater extent. *Ibid* at 604.

[30] *Lifchez v. Hartigan*, 735 F. Supp. 1361, 1377 (ND Ill. 1990).

[31] George J. Annas, "Human Cloning: Should the United States Legislate Against It?," *ABA J.*, (May, 1997): 80; *see also* George J. Annas, "Human Cloning: A Choice or an Echo," *Dayton L. Rev.* 23 (1998): 247.

[32] As described in Section 1, this statement is not strictly correct. The somatic cell nucleus provides the majority of the genetic material for the clone, but the egg provides additional genetic material in the form of mitochondrial DNA.

[33] Peter Gorner, "Embryo is picked to try to save sister's life," *Chicago Tribune*, October 2, 2000.

[34] Lori B. Andrews, "Is There a Right to Clone? Constitutional Challenges to Bans on Human Cloning," Harv. J.L.& Tech. 11 (1998): 643, 667.

[35] John A. Robertson, "Liberty, Identity, and Human Cloning," *Tex. L. Rev*. 76 (1998): 1371, 1439-53.



[36] Michael H. Shapiro, "I Want a Girl (Boy) Just Like the Girl (Boy) that Married Dear Old Dad (Mom): Cloning Lives," *S. Cal. Interdisciplinary L.J.*, 9, (1999): 1, 275-92.

[37] Remarks by the President, 1997 Westlaw 91958 (White House), Mar. 4,1997) accompanying the Directive on Cloning, 1997 Westlaw 91957 (White House), Mar. 5, 1997).

[38] National Institutes of Health, Guidelines for Research Using Human Pluripotent Stem Cells, 65 Fed. Reg. 51976, 51981 (Aug. 25, 2000).

[39] Cal. Health & Safety Code sections 24185, 24187; Cal. Stats. 1997, c.688 section 1 (S.B. 1344); La. Rev. Stat. Ann. sections 1299.36 *et seq.*; Mich. Comp. Laws section 750.430a (1); Mich. Comp. Laws section 333.16274(5); Mo. Rev. Stat. section 1.217; R.I. Gen. Laws section 23-16.4-1 *et seq.*

[40] N.H. Rev. Stat. Ann. § 168-B:15.

[41] *See* Henry T. Greely, *Banning "Human Cloning": A Study in the Difficulties of Defining Science,* 8 S. Cal. Interdisciplinary L.J. 131, 148-49 (1998).

[42] All of the considerations that we have suggested as leading to a "race to the bottom" among competing states would, of course, also apply to competing countries. So, for example, if the federal government decided to regulate some activity more heavily than other nations do, then it is possible that business and individuals will leave the United States for the less heavily regulating nations.

[43]The survey was conducted under the auspices of the Public Opinion and Public Policy (POPP) Poll, a joint project of the Department of Political Science, University of Illinois at Chicago, and the Institute of Government and Public Affairs, University of Illinois. Interviews were conducted by the Office for Survey Research of the University of Illinois at Springfield. Findings were adjusted to reflect the regional and demographic makeup of the Illinois population. On the basis of the sample size, the statistical margin of error (or 95 percent confidence interval) is plus-or-minus 4.3 percent for the entire sample. Because the sample was split to permit comparisons between two major series of questions, however, the margin of error is 6.2 percent for many of the central findings. As in any survey, other potential sources of error cannot be estimated statistically.





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